ferment which is capable of effecting in any considerable degree the decomposition of rubian, as the best proof of its being a peculiar and distinct substance. When prepared by precipitation with alcohol, erythrozym is obtained as a chocolate-coloured granular mass. When dried it coheres into hard lumps, which are almost black, and with difficulty reduced to powder. When the dry substance is heated on platinum foil, it emits a smell somewhere between that of burning peat and burning horn, and then burns without much flame, leaving a considerable quantity of residue, which on being further heated is soon converted into a white or grey ash.

After having once been precipitated from its watery solution, even by alcohol, erythrozym cannot again be dissolved in water. If it be mixed while in a moist state with water, it forms a reddish-brown turbid liquid, in which it exists however merely in a state of suspension. Erythrozym is not an uncombined substance, but is a definite compound of an organic body with lime. When treated with acids the lime is removed, and the colour of the substance changes from reddish-brown to yellowish-brown. If a mixture of erythrozym and water be allowed to stand for some time, the former enters into a state of putrefaction, accompanied by a disengagement of gas. After it has entered on this stage of decomposition, it loses in great part the power of decomposing rubian, but acquires that of producing an acid reaction in a solution of sugar. Erythrozym contains nitrogen, but in much smaller proportion than most other fermentative substances. Its composition, when in a freshly precipitated state, is expressed by the formula $C_{56} H_{34} N_2 O_{40} + 4CaO$. When allowed to decompose, it loses carbonic acid, water, and lime. A quantity which had been employed for the purpose of effecting the decomposition of rubian, and then separated again from the products of the action, had a composition corresponding to the formula $C_{52} H_{32} N_2 O_{30} + 3CaO$.

In conclusion, the author gives the results of some experiments undertaken with the view of ascertaining whether madder contains more than one colouring matter or not. He infers from his experiments, that the purpurine of other chemists is not a substance of determinate composition; that it consists sometimes of alizarine alone, sometimes of verantine alone, sometimes of a variable mixture of both; that only one colouring matter, viz. alizarine, can be obtained from madder; that purpurine, madder-purple, and the various similar bodies derived from madder, owe their property as colouring matters to an admixture of alizarine; and that they are simply the latter substance in a state of impurity.

3. "Experiments towards the construction of new forms of Instruments for the correction of Compass Errors due to the presence of iron in ships; with investigations on the nature of the attraction of Iron on the poles of Magnets." By Julius Roberts, Esq., Lieut. R.M. Artillery. Communicated by Capt. W. H. Smyth, R.N., For. Sec. R.S. Received March 25, 1852.

The object of the author's experiments and investigations is stated

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to have been the production of an instrument that would, under all variety of circumstances, give a correct (magnetic) meridian direction, or in some way indicate the amount of its own error; and he considers that he has, at least partially, succeeded in the attainment of this object in the instrument described in this paper, and of which drawings accompany the communication.

In order to determine the nature of the action of a mass of iron on a magnetic needle, the author constructed needles with the magnetic bar wholly on one side of the central support, counterpoised by an arm carrying a weight on the other. In some of these the magnetic bar was straight, in others it was bent in the middle, either the upper or lower half being horizontal. He also constructed a compound needle of two such bent bars, suspended concentrically with two of their contrary poles remote, the other two poles being the one above and the other below the points of support. In order to give magnetic stability to the compound needle, an arc of soft iron was attached to the extremity of the counterpoising arm of each magnet, so as to be in close proximity, though not actually to touch the other. Attached to the counterpoise arms were the halves of a compass-card cut through the east and west points, and so adjusted that the edge of one was vertically over that of the other when the needles were in the same vertical plane, but crossed each other when the needles deviated from the same direction. The author considered that a mass of iron attracting each pole of this compound needle would cause the cards to cross each other, and thus give the amount of deviation due to that mass, but found that, instead of the cards crossing, the needles deviated in contrary directions so as to remain in one straight line, as if they had been rigidly connected.

To obviate this, for the magnet having its unmarked end pointing south was substituted one having its marked end in that direction, but of less power than that of which the marked end pointed north; and two magnets rigidly connected in the same straight line, with their marked ends remote, were balanced concentric with the other two. The author considers that the result of this combination would be, that this astatic bar would, by the repulsion between its poles and those of the other magnets, take up a position at right angles to the magnetic meridian, the other magnets pointing due north and south. Further, that the north pointing and south pointing ends of the compound needle on the half cards being poles of the same name, that is, both marked, any mass of iron which attracted one end would also attract the other, and thus the half cards which they carried would be caused to cross each other. So that the whole being properly adjusted, the deviations caused by the iron on the two needles will be equal, and the error of deviation of either one will be half the angle between the two. A figure of this complicated compass accompanies the description.

In conclusion, the author states that the practicability of rendering the instrument so simple and accurate as to be generally useful, depends on experiments and investigations yet to be made; and then enters upon a calculation, from which, however, no definite results are deduced.

June 17, 1852.

The EARL OF ROSSE, President, in the Chair.

The following gentlemen were admitted:—

Rev. Jonathan Cape.
John Mercer, Esq.
John Tyndall, Esq.

The following gentlemen were recommended by the Council for election as Foreign Members:—

Adolphe Theodore Brongniart.
Benjamin Peirce.
J. Lamont.
V. Regnault.

I. "On the Impregnation of the Ovum in the Amphibia (Second Series revised), and on the direct agency of the Spermatozoon." By George Newport, F.R.S., F.L.S. &c. Received June 17, 1852.

The author remarks that, having in a former paper shown that the spermatozoon alone is the impregnatory agent, he endeavoured in a subsequent communication to the Royal Society, a report of which is printed in the Proceedings for June 1851, to arrive at some conclusion as to the nature of its influence; and, from the facts he was then acquainted with, he announced the view that the spermatozoon appeared to be the organ of a special form or condition of force in the animal body. At that time he had no evidence that the spermatozoon penetrates into the coverings of the egg, as he had constantly found it attached only to the surface. Since then he has detected it within the substance of these coverings, and sometimes even partially imbedded in the vitelline membrane beneath them; but he has no evidence that it enters the vitelline cavity. While therefore the fact of penetration into the envelopes necessitates some revision of the details of the view announced, he still regards the spermatozoon as the organ of a special condition or form of force in the animal structure.

He then proceeds to show the relative duration of vitality in the spermatozoon and the egg, and points out that that of the former is shorter than is usually supposed; that at the temperature of 55° Fahr. it usually is lost in from three to four hours after removal from the body into water; but that at a lower temperature it is retained longer, and that when the spermatic fluid has contained many undeveloped cells, and has been preserved in a temperature of 51° Fahr., it has fertilized at the end of twenty-four hours. The egg loses its fitness to be impregnated very soon after it is passed into water, usually within the first hour, owing chiefly to the endosmosis and expansion of its envelopes. But when retained within the body of